

ch 3

#9

$$\lambda = 4.2 \times 10^{-7} \text{ m} = 420 \text{ nm}$$

$$V_s = 0.65 \text{ V}$$

$$\lambda = 3.1 \times 10^{-7} \text{ m} = 310 \text{ nm}$$

$$V_s = 1.69 \text{ V}$$

$$V = \frac{c}{\lambda}$$

C.E

Kramer's
h not known!

$$eV_s = h\nu - \phi$$

$$e(0.65 \text{ V}) = \frac{hc}{4.2 \times 10^{-7} \text{ m}} - \phi$$

$$e(1.69 \text{ V}) = \frac{hc}{3.1 \times 10^{-7} \text{ m}} - \phi$$

2 eq, 2 unknowns (h, ϕ)

Subtract 1 from 2

$$(1.04 \text{ V})e = hc \left(\frac{1}{3.1 \times 10^{-7}} - \frac{1}{4.2 \times 10^{-7}} \right)$$

$$h = \frac{(1.04 \text{ V})e}{c} \left(\frac{1}{3.1 \times 10^{-7}} - \frac{1}{4.2 \times 10^{-7}} \right)$$
$$= 4.10 \times 10^{-15} \text{ eV} \cdot \text{s} \quad \checkmark$$

then we can substitute in either eq

$$\phi = -e(0.65 \text{ V}) + \frac{hc}{4.2 \times 10^{-7}}$$
$$= -0.65 \text{ eV} + \frac{1230 \text{ eV} \cdot \text{nm}}{420 \text{ nm}} = 3.58 \text{ V}$$
$$= 2.28 \text{ eV}$$